

THE MYCETOZOA OF NEW SOUTH WALES.

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The members of the class Mycetozoa or Myxomycetes have a remarkably wide distribution throughout the world. They are found both in tropical and in cold regions, but appear to be most abundant in the cooler moist parts of the temperate zone.

Many species are known which are common in Europe, America, Australia, etc., and which retain their specific characters exactly in all localities. On the other hand, certain species vary widely in the same locality, and even in the one group of individuals.

The wide distribution of the class as a whole, and of individual species in particular, is probably due to the fact that their spores are very small and light, and are therefore readily transportable. Also the spores of some species are known to remain in a viable condition for as long as 7 years. Most, however, will not germinate after 1-2 years.

The members of the class Mycetozoa are chiefly small and insignificant, so that they must frequently be overlooked by collectors. Also their habitat is, as a rule, inconspicuous. Principally, they are found on decaying fallen logs and bark, frequently on the lower surfaces, and on dead leaves and grass. Some are cosmopolitan in their habitat, for example the Physarums, which are found on wood, grass, and leaves. Others are more restricted in their distribution. *Cribraria* and *Dictydium*, for example, occur on decaying wood. *Fuligo septica*, on the other hand, is widely distributed; it is common on the sawdust in tan-yards, on decaying wood and bark, on twigs, leaves, and grass. Some species of *Comatricha* and *Stemonitis* are found only on wood or bark, others are chiefly found on leaves.

Cooke (1892) records 49 species of Mycetozoa collected from Australia, but of these only *Arcyria Oerstedtii* Rost. (*A. fuliginea* Mass.), *Mucilago spongiosa* Morgan (*Spumaria alba* Bull.), and *Badhamia varia* Mass., which has been subdivided into three species by Lister (1925), are reported specifically from New South Wales. Three additional species are given by McAlpine (1895), but of these none is from New South Wales. A later list by McAlpine (1898) includes *Physarum cinereum* Pers., *Stemonitis fusca* Roth., and *Badhamia utricularis* Berk.

In 1918, Cheel published a list comprising those species already known from New South Wales, together with a large number of new records. This list contained 48 species, representing 28 genera and 11 families. The next important contribution was by Cleland (1927), the number of species recorded from New South Wales being raised by 12. Cleland's record also furnishes data as to the relative abundance of the species occurring here.

In the following list, 23 species are recorded for the first time from New South Wales. The species already reported by the authors mentioned, are also

incorporated in the list. Notes on the habitat, abundance, and seasonal occurrence are given wherever possible.

1. Subclass EXOSPOREAE.

Family CERATIOMYXEAEE.

Ceratiomyxa fruticulosa Macbr. One of the commonest of the Mycetozoa, found on the coast and highlands throughout the year, especially during the autumn, on rotting wood and bark. (C., Cl., F.)*

2. Subclass ENDOSPOREAE.

Family PHYSARACEAE.

Badhamia capsulifera Berk. Orange, October, 1916. (Cl.)

B. papaveracea Berk. & Rav. Sydney district, on apple twigs, March, 1931. (F.)

B. utricularis Berk. (McAlp., C.)

Physarum leucopus Link. Sydney district, on earth, leaves and sticks, May, 1931. (F.)

P. dictyospermum Lister. (C.)

P. viride Pers. One of the commonest of the Mycetozoa on the coast and highlands. Found at all times of the year, on dead wood, bark, twigs and leaves. (C., Cl., F.)

P. viride var. *aurantium* Lister. Sydney district, on dead wood, March, 1931. Mt. Wilson, on dead wood, March, 1931. (F.)

P. viride var. *incanum* Lister. Fairly common in the Sydney district, especially during the autumn, on dead wood. (C., F.)

P. rigidum G. Lister. Mt. Wilson, on dead wood and bark, March, 1931. Sydney district, on wood, March, 1931. (F.)

P. flavicolum Berk. Fairly common in the Sydney district, on dead wood. (Lister, C., F.)

P. Maydis Torrend. Sydney district, on dead log, April, 1931. (F.)

P. pusillum Lister. Sydney district, on dead bark and wood, March, 1931. (F.).

P. didermoides Rost. Wollongbar, N.S.W. (Cl.)

P. nutans Pers. Common around Sydney, on dead wood. (C., Cl., F.)

P. nutans var. *leucophaeum* Lister. Common in the Sydney District. (C.)

P. compressum Alb. & Schw. Sydney district, August. (Cl.)

P. reniforme Lister. Hawkesbury River, Wollongbar, June, 1913. (Cl.)

P. cinereum Pers. Common throughout New South Wales, especially in the autumn. (C., Cl., F., McAlp.)

P. vernum Somm. Mt. Wilson, on dead wood, March, 1931. Sydney, on twigs, straw, etc., October, 1930. Warialda, on grass, December, 1931. (F.)

P. gyrosom Rost. Sydney Botanic Gardens. (C.)

P. sinuosum Weinm. Sydney district. (C.)

P. bitectum Lister. (C.)

Fuligo septica Gmelin. Common throughout the State, especially the coast and highlands, at all times of the year, but mostly in the summer, on wood, twigs, etc. (C., Cl., F.)

F. septica var. *candida* Fr. Broken Hill, April, 1917. Hawkesbury River, January. (Cl.)

F. cinerea Morgan. Hawkesbury River, April, 1913. Sydney district, March, 1914. (Cl.)

* C. = Cheel, Cl. = Cleland, F. = Fraser, McAlp. = McAlpine.

- Cienkowskia reticulata* Rost. Sydney district, on grass, May, 1931. Mt. Wilson, on dead wood and bark, March, 1931. (F.)
- Craterium leucocephalum* Ditm. Sydney district, on dead leaves and twigs, March, 1931. (F.)
- C. leucocephalum* var. *scyphoides* Lister. Sydney district, on twigs, May, 1931. (F.)
- Leocarpus fragilis* Rost. (C.)
- Diderma effusum* Morgan. (C.)
- D. radiatum* Lister. (C.)
- Diachaea leucopoda* Rost. Common around Sydney. (C., Cl.)

Family DIDYMIACEAE.

- Didymium difforme* Duby. (C.)
- D. melanospermum* Macbr. Sydney district, on dead twigs, March, 1931. (F.)
- D. nigripes* Fries. Sydney district and National Park, on dead leaves and twigs, not uncommon. (Cl., F.) Specimens near to *D. nigripes* var. *xanthopus* Lister are also not uncommon.
- D. squamulosum* Fries. (C.)
- D. leoninum* Berk. & Br. (C.)
- Mucilago spongiosa* Morgan. (Cooke, C.)

Family COLLODERMACEAE.

- Colloderma oculatum* G. Lister. (C.)

Family STEMONITACEAE.

- Stemonitis fusca* Roth. Fairly common and widespread, especially in autumn, on dead wood. (McAlp., C., F.)
- S. splendens* Rost. Common and widespread throughout the State at all times of the year, on dead wood and bark. (Cl., F.)
- S. splendens* var. *Webberi* Lister. National Park. (C.)
- S. splendens* var. *flacida* Lister. Canberra, January, 1933. (N. White.)
- S. herbatica* Peck. Sydney district, March, 1914; October, 1916. (C.)
- S. ferruginea* Ehrenb. Sydney district, on dead wood, March, 1931; July, 1932. Parramatta. (C., F.)
- Comatricha nigra* Schroet. Common throughout the State, especially in the Sydney district, at all times of the year, on dead wood and bark. (C., Cl., F.)
- C. laxa* Rost. Sydney district, on dead wood and bark, March, 1931. (F.)
- C. elegans* Lister. Sydney district, on dead wood and bark, July, 1932. (F.)
- C. pulchella* Rost. var. *fusca* Lister. Sydney district, March, 1931. (F.)
- C. typhoides* Rost. Fairly common in the Sydney district, on dead wood. (C., Cl., F.)
- C. irregularis* Rex. (C.)
- Enerthenema papillatum* Rost. Sydney district, on charred wood, March, 1931. (F.)
- Clastoderma Debaryanum* Blytt. I have only collected this species once, at Avoca, Gosford District, September, 1930. Rare. (C., F.)

Family HETERODERMACEAE.

- Cribraria argillacea* Pers. (C.)
- C. vulgaris* Schrad. Sydney district, on dead wood, April, 1932; National Park, on dead wood, January, 1931. (F.)

- C. macrocarpa* Schrad. Mt. Wilson, on dead wood, November, 1931. (F.)
C. intricata Schrad. var. *dictydioides* Lister. Sydney district, on dead wood, March, 1931. (F.)
C. tenella Schrad. var. *concinna* G. Lister. Sydney district, on dead wood, May, 1931. Hawkesbury River district, on dead wood, July, 1932. (F.)
Dyctidium cancellatum Macbr. Sydney district, on dead wood, March, 1931. (C., F.)

Family TUBULINACEAE.

- Tubifera ferruginosa* Gmel. Common throughout the coast and highlands, on dead wood and bark. (C., Cl., F.)

Family RETICULARIACEAE.

- Dictydiaethalium plumbeum* Rost. Common throughout the State at all times of the year, on bark. (C., F.)
Reticularia lycoperdon Bull. Sydney district, May, 1913. (Cl.) Mt. Wilson, on dead wood, March, 1931. (F.)

Family LYCOGALACEAE.

- Lycogala epidendrum* Fries. Common on the coast and highlands, especially in the autumn, on dead wood. (C., Cl., F.)

Family TRICHIACEAE.

- Trichia verrucosa* Berk. Common on the coast and highlands, throughout the year, on twigs, bark, wood, etc. (C., Cl., F.)
T. affinis de Bary. Fairly common in the Sydney district, on dead twigs, leaves and wood. (C., F.)
T. persimilis Karst. (C.)
T. varia Pers. Very common on the coast and highlands, especially about Sydney, throughout the year, on dead twigs, leaves and wood. (C., Cl., F.)
T. erecta Rex. (C.)
T. decipiens Macbr. Common throughout the year, on dead wood. (C., F.)
T. floriformis G. Lister. Very common throughout the year in the Sydney district, and highlands, on dead wood. (C., Cl., F.)
Hemitrichia Vesparium Macbr. Sydney district on dead wood, February, 1931. (C., F.)
H. clavata Rost. Sydney district, on charred wood, July, 1932. Mt. Wilson, on dead wood, March, 1931. (F.)
H. Serpula Rost. (C.)

Family ARCYRIACEAE.

- Arcyria ferruginea* Sauter. Coastal district and mountains, very common throughout the year. (C., Cl., F.)
A. cinerea Pers. Common in the Sydney district, throughout the year, on dead wood. (C., Cl., F.)
A. denudata Sheldon. Common in the coastal district and mountains throughout the year, on dead wood. (Cl., F.)
A. insignis Kalchbr. & Cooke. (Cl.)
A. glauca Lister. Sydney district, on dead twig, May, 1931. (F.)
A. incarnata Pers. Botanic Gardens, Sydney. (C.)
A. incarnata var. *fulgens* Lister. Mt. Wilson, on dead wood, March, 1931. (F.)

- A. nutans* Grev. Fairly common in the Sydney district, on dead wood.
(C., Cl.)
- A. Oerstedtii* Rost. On leaves of *Atherospermum* (Cooke).
Perichaena depressa Libert. Hawkesbury River. (Cl.)
- P. corticalis* Rost. (C.)
- P. vermicularis* Rost. Sydney district, on dead wood and bark, March, 1931.
(F.)

Family MARGARITACEAE.

- Dianema depressum* Lister. Mt. Wilson, on dead wood, August, 1932. (F.)

This list of Mycetoza includes 88 species and varieties, most of them being recorded from the environs of Sydney and the adjacent highlands. There is no reason to doubt that they occur in equal numbers along the whole of the coast and highlands, since the climate is quite suitable for their development. Very few records are known for the western parts of the State, and it seems quite probable that they do not occur there at all frequently, the relatively hot and dry climate being unsuitable for their development.

In the coastal and mountain districts, the Mycetoza are chiefly found along the margins of shady creeks and similar moist places in and bordering patches of rain forest. Few are reported from the open sunny woodlands, even of the coastal district. Of those which have been found in relatively exposed places the following are the most common: *Arcyria ferruginea*, *Fuligo septica*, *Didymium* spp., *Dictydiaethalium plumbeum*. *Dianema depressa* and the various species of *Cribraria* and *Dictydium* are found only in the most shady, moist places.

The genera in which most species have been recorded are: *Physarum* (19 species), *Arcyria* (9 sp.), *Trichia* (7 sp.), *Comatricha* (6 sp.), *Stemonitis* (5 sp.), *Cribraria* (5 sp.), *Didymium* (5 sp.).

From the point of view of world distribution, as well as their numbers in Australia, these genera are amongst the largest, in that the largest number of different species have been attributed to them.

There are, however, several notable exceptions. The genera *Badhamia*, *Diachaea*, *Diderma*, and *Hemitrichia* are poorly represented, there being only 3, 1, 2 and 3 species respectively reported from New South Wales, while no species of the genus *Lamproderma* is known here. It may be that further search will reveal more of these species, but at present it seems as if many common northern hemisphere species are lacking here. There is also a significant lack of the limey stalked *Badhamias* and *Physarums*. The warmer climate *Physarums*, *Cribrarias*, *Cienkowskia*, etc., are, on the other hand, moderately well represented.

The commonest species amongst the collections so far made here are *Stemonitis splendens*, *Arcyria ferruginea*, *Cevatiomyxa fruticulosa*, *Physarum viride* and varieties, *Dictydiaethalium plumbeum*, *Tubifera ferruginosa*, *Fuligo septica*, *Trichia varia* and *T. floriformis*. All of these are widespread, and most of them are common throughout the world.

Only seven species of those recorded from New South Wales are not widespread elsewhere. Of these, *Physarum dictyospermum* and *P. flavicolum* are reported from New Zealand. *Physarum Maydis*, *P. reniforme*, *P. gyrosum* and *Didymium leoninum* are reported from Japan, Ceylon, Java, etc., and *Arcyria glauca* has not been reported previously outside of Japan, where it has been collected only on three occasions.

In conclusion, I desire to thank Miss G. Lister, who identified some of the species here recorded, and Professor T. G. B. Osborn, Department of Botany, University of Sydney, for helpful advice.

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Postscript, added 30th November, 1933.—*Dictydium rutilum* G. Lister (*Journ. Bot.*, 1933, pp. 222-223) has recently been described from material collected in the Sydney district, N.S.W., on decaying wood, February, 1931; and from Mt. Wilson, on wood and bark, March, 1931. (F.)
